USDA Natural Resources Conservation Service

Ecological site R058DY011SD
Clayey

Accessed: 04/19/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

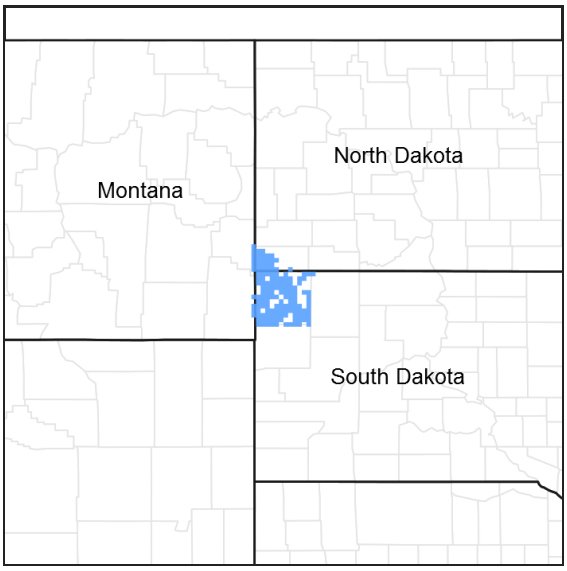


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Classification relationships

Level IV Ecoregions of the Conterminous United States: 43e – Sagebrush Steppe.

Associated sites

R058DY013SD	**Claypan**
R058DY015SD	**Thin Claypan**

Similar sites

R058DY013SD	**Claypan** Claypan [more blue grama; more cactus; less productive]
R058DY015SD	**Thin Claypan** Thin Claypan [less western wheatgrass; more blue grama; less productive]

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified

Herbaceous	(1) *Pascopyrum smithii* (2) *Nassella viridula*

Physiographic features

This site occurs on nearly level to moderately steep uplands.

Table 2. Representative physiographic features

Landforms	(1) Terrace (2) Hill (3) Plain
Flooding frequency	None
Ponding frequency	None
Elevation	2,300–4,000 ft
Slope	0–6%
Water table depth	80 in
Aspect	Aspect is not a significant factor

Climatic features

The climate in this MLRA is typical of the drier portions of the Northern Great Plains where sagebrush steppes to the west yield to grassland to the east. Annual precipitation ranges from 14 to 16 inches. Most of the rainfall occurs as frontal storms early in the growing season. Some high intensity, convective thunderstorms occur in the summer. Precipitation in winter occurs as snow. Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Outbreaks of cold air from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring. The normal average annual temperature is about 44°F. January is the coldest month with average temperatures ranging from about 12°F (Marmarth, North Dakota (ND)), to about 20°F (Baker, Montana (MT)). July is the warmest month with temperatures averaging from about 70°F (Marmarth, ND), to about 76°F (Baker, MT). The range of normal average monthly temperatures between the coldest and warmest months is about 55°F. Hourly winds are estimated to average about 11 miles per hour (mph) annually, ranging from about 13 mph during the spring to about 10 mph during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more

than 50 mph.

Growth of cool-season plants begins in early to mid-March, slowing or ceasing in late June. Warm-season plants begin growth about mid-May and can continue to early or mid-September. Greenup of cool season plants may occur in September and October when adequate soil moisture is present.

Table 3. Representative climatic features

Frost-free period (average)	123 days
Freeze-free period (average)	140 days
Precipitation total (average)	16 in

Influencing water features

No significant water features influence this site.

Soil features

The soils in this site are well drained and formed in alluvium and residuum derived primarily from shale and siltstone. The silty clay loam surface layer is about six inches thick. The soils have a slow infiltration rate. When dry these soils crack. Wet surface compaction can occur with heavy traffic. This site typically should show slight to no evidence of rills, wind scoured areas, or pedestalled plants. Water flow paths are broken, irregular in appearance, or discontinuous. The soil surface is stable and intact. Subsurface soil layers are nonrestrictive to water movement and root penetration.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases on slopes greater than about five percent.

Access Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm) for specific local soils information.

Table 4. Representative soil features

Surface texture	(1) Silty clay loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Very slow
Soil depth	20–80 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–5%
Available water capacity (0-40in)	5–7 in
Calcium carbonate equivalent (0-40in)	0–3%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions. While the following plant community descriptions describe more typical transitions between communities that will occur, severe disturbances, such as periods of well below average precipitation, can cause significant shifts in plant communities and/or species composition.

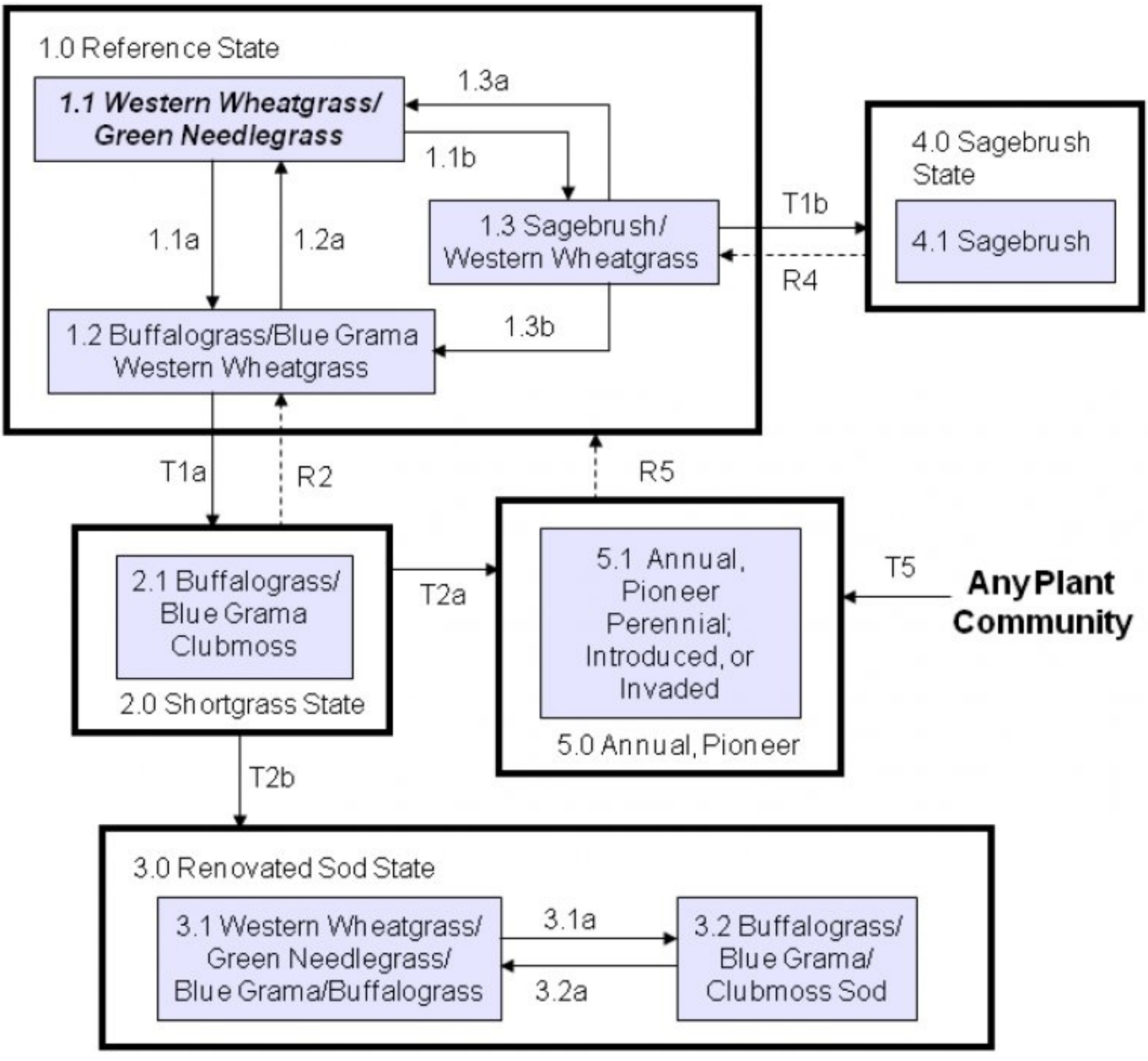
The plant community upon which interpretations are primarily based is the Western Wheatgrass/Green Needlegrass Plant Community. This plant community has been determined by studying rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used. Plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

Heavy continuous grazing and/or continuous seasonal (spring) grazing, without adequate recovery periods following each grazing occurrence causes this site to depart from the Western Wheatgrass/Green Needlegrass Plant Community. Blue grama will begin to increase. Western wheatgrass will increase initially and then begin to decrease. Green needlegrass will decrease in frequency and production. In time, heavy continuous grazing will likely cause upland sedges and blue grama to dominate and clubmoss to increase. This resulting plant community is relatively stable and the competitive advantage prevents other species from establishing. This plant community is less productive than the Western Wheatgrass/Green Needlegrass Plant Community. Runoff increases and infiltration will decrease. Soil erosion will be minimal.

Extended periods of nonuse and/or lack of fire will result in a plant community having high litter levels, which favors an increase in Kentucky bluegrass. Shrubs such as western snowberry will also typically increase.

The following is a diagram that illustrates the common plant communities that can occur on the site and the transition pathways between communities. The ecological processes are discussed in more detail in the plant community descriptions following the diagram.

State and transition model



State 1
Reference

The State narrative is under development.

Community 1.1
Western Wheatgrass/Green Needlegrass

The interpretive plant community for this site is the Western Wheatgrass/Green Needlegrass Plant Community. This is also considered to be climax. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and sometimes on areas receiving occasional short periods of deferment. The potential vegetation is about 80-90 percent grasses or grass-like plants, 5-10 percent forbs, 5-10 percent shrubs, and 0-1 percent cryptogams. Cool-season grasses dominate this plant community. The major grasses include western wheatgrass and green needlegrass. Other grasses or grass-like species occurring on the site include blue grama, big bluestem, prairie Junegrass, buffalograss, and sedge. Significant forbs include American vetch, cudweed sagewort, dotted gayfeather, white prairie aster, and purple prairie clover. The significant shrubs that occur include fringed sagewort, big sagebrush, snowberry, silver sagebrush, and rose. This plant community is well adapted to the Northern Great Plains climatic conditions. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). The diversity in plant species allows for high drought tolerance. This is a healthy and sustainable plant community. Moderate or high available water capacity provides a favorable soil-water-plant relationship. Overall, the interpretive plant community has the appearance of being stable, diverse, and productive. Plant litter is properly distributed with very little movement offsite and natural plant mortality is very low.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1120	1615	2210
Shrub/Vine	90	142	195
Forb	90	143	195
Tree	0	10	20
Total	**1300**	**1910**	**2620**

Figure 5. Plant community growth curve (percent production by month). SD5801, Northern Rolling High Plains, cool-season dominant.. Cool-season dominant, uplands..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	4	12	25	36	10	5	4	4	0	0

Community 1.2
Buffalograss/Blue Grama/Western Wheatgrass

This plant community develops under continuous seasonal grazing (i.e., grazing an area during the same season every year) or from over utilization during extended drought periods. The potential vegetation is made up of approximately 80-90 percent grasses and grass-like species, 5-10 percent forbs, 5-10 percent shrubs, and 0-3 percent cryptogams. The dominant grasses include blue grama and western wheatgrass. Other grasses or grass-like species may include sedge, buffalograss, green needlegrass, and prairie Junegrass. Significant forbs include cudweed sagewort, scurfpea, white prairie aster, and western yarrow. The dominant shrubs that occur include fringed sagewort, western snowberry, and cactus. Compared to the Western Wheatgrass/Green Needlegrass Plant Community, the shortgrass species including blue grama and sedge have increased. The cool-season species including western wheatgrass and green needlegrass have decreased in composition. Annual bromes, curlycup gumweed, sweetclover, and other annual grasses and forbs can invade the site. This plant community can occur in a mosaic with patchy, slightly used areas occurring adjacent to and intermingled with this plant community. This plant community is somewhat resistant to change. The dominant herbaceous species are very adapted to grazing; however, the mid-grass species and the more palatable forbs will decrease. If the herbaceous component is intact, it

tends to be resilient if disturbance is not long-term. Because of the sod forming habit of the shortgrass species, water infiltration is lower, and runoff is moderate to high. Typically, the runoff is very clean because of the low potential for onsite soil erosion. However, offsite areas may be affected by increased runoff.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	590	1002	1500
Forb	55	90	130
Shrub/Vine	55	90	130
Moss	0	18	40
Total	**700**	**1200**	**1800**

Figure 7. Plant community growth curve (percent production by month). SD5803, Northern Rolling High Plains, cool-season/warm-season co-dominant.. Cool-season, warm-season co-dominant, uplands..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	20	28	21	10	5	3	0	0

Community 1.3
Sagebrush/Western Wheatgrass

This plant community develops from continuous season-long grazing and the absence of fire. It will also develop with extended periods of nonuse and lack of fire. Sagebrush will typically increase whenever the vigor of the perennial herbaceous vegetation is reduced and fire is absent. This plant community is made up of 65-85 percent grasses and grass-like species, 5-10 percent forbs, 10-25 percent shrubs, and 1-3 percent cryptogams. The dominant grasses include western wheatgrass, green needlegrass, blue grama, and buffalograss. As conditions deteriorate, desirable species are replaced by big sagebrush. Blue grama, buffalograss, prairie Junegrass, and Sandberg bluegrass increase in the plant community. Annual brome, other annuals, and Kentucky bluegrass can invade the plant community. Under proper management, this plant community is stable. The soil erosion is low to moderate. Infiltration and runoff are moderate. Subsoil moisture conditions are typically drier than grass dominated plant communities due to the high water demand of the big sagebrush. This makes big sagebrush highly competitive with other species.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	865	1168	1295
Shrub/Vine	145	280	475
Forb	75	120	180
Moss	15	32	50
Total	**1100**	**1600**	**2000**

Figure 9. Plant community growth curve (percent production by month). SD5802, Northern Rolling High Plains, cool-season dominant, warm-season subdominant. Cool-season dominant, warm-season subdominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	23	34	15	6	5	4	0	0

Pathway 1.1a
Community 1.1 to 1.2

Continuous seasonal grazing during the active growing period of cool-season plants will lead to the

Buffalograss/Blue Grama/Western Wheatgrass Plant Community.

Pathway 1.1b
Community 1.1 to 1.3

Continuous season-long grazing and no fire will lead to the Sagebrush/Western Wheatgrass Plant Community. This occurs with exposure to herbivory during the entire growing season at moderate stocking rates and extended periods with no fire.

Pathway 1.2a
Community 1.2 to 1.1

Prescribed grazing, which allows for adequate plant recovery periods will move this plant community to the Western Wheatgrass/Green Needlegrass Plant Community.

Conservation practices

Prescribed Grazing

Pathway 1.3a
Community 1.3 to 1.1

With brush management and prescribed grazing, including adequate recovery periods, this plant community will shift to the Western Wheatgrass/Green Needlegrass Plant Community.

Conservation practices

Brush Management
Prescribed Grazing

Pathway 1.3b
Community 1.3 to 1.2

Brush management, coupled with continuous long season grazing will shift this plant community to Buffalograss/Blue grama/Western Wheatgrass

State 2
Shortgrass

The State narrative is under development.

Community 2.1
Buffalo/Blue Grama/Clubmoss

This plant community develops under heavy continuous season-long grazing, or with continuous seasonal grazing with concentrated use in the early part of the growing season (as in calving/lambing pastures). It is made up of approximately 75-90 percent grasses and grass-like species, 5-10 percent forbs, 5-10 percent shrubs, and 1-7 percent cryptogams. The dominant grass grass-like species include blue grama and sedge. Other grasses may include western wheatgrass, prairie Junegrass, buffalograss, and cheatgrass. The dominant forbs include cudweed sagewort, scurfpea, woolly Indianwheat, and western yarrow. The dominant shrubs include fringed sagewort and cactus. Compared to the Western Wheatgrass/Green Needlegrass Plant Community, blue grama and sedge have increased, and the cool-season mid-grasses have diminished greatly. Nonpalatable forbs and cactus have increased, and nonnative species have invaded the site. Plant diversity is low. This plant community is very stable. Generally, this plant community will require significant management inputs (i.e., high animal impact, long-term prescribed grazing, favorable climatic conditions, etc.,) and time to move it towards the Buffalograss/Blue Grama/Western Wheatgrass Plant Community. Onsite soil erosion is low. Infiltration is low and runoff is high. Typically, the runoff is very clean because of the low potential for onsite soil erosion. However, offsite areas can be

significantly impacted due to the increased runoff.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	335	567	900
Forb	30	53	75
Shrub/Vine	30	53	75
Moss	5	27	50
Total	**400**	**700**	**1100**

Figure 11. Plant community growth curve (percent production by month). SD5804, Northern Rolling High Plains, warm-season dominant, cool-season sub-dominant.. Warm-season dominant, cool-season sub-dominant, uplands..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	18	24	25	15	7	1	0	0

State 3
Renovated Sod

The State narrative is under development.

Community 3.1
Renovated Westeran Wheatgrass/Green Needlegrass/Blue Grama/Buffalograss

The renovated Western Wheatgrass/Green Needlegrass/Blue Grama/Buffalograss Plant Community will have similar plant composition and growth curve characteristics as the Western Wheatgrass/Blue Grama/Buffalograss Plant Community. However, the production will likely be higher, depending on the degree of alteration. Proper grazing management must be implemented to maintain this plant community. Continuous season-long grazing will move this plant community to the renovated Blue Grama/Buffalograss Sod Plant Community.

Community 3.2
Renovated Blue Grama/Buffalograss

The renovated Blue Grama/Buffalograss Plant Community is similar to the non-renovated Blue Grama/Buffalograss Plant Community in most respects. The main difference is the microrelief created by the renovation.

Pathway 3.1a
Community 3.1 to 3.2

Continuous long season grazing will lead to the Buffalograss/Blue Grama/Clubmoss Sod Plant Community.

Pathway 3.2a
Community 3.2 to 3.1

Mechanical Renovation and Prescribed Grazing will move this community back to the Western Wheatgrass/Green Needlegrass/Blue Grama/Buffalograss Plant Community.

Conservation practices

Prescribed Grazing

State 4

Sagebrush

The State narrative is under development.

Community 4.1
Sagebrush

This plant community is the result of protection from grazing and fire, and continuous season-long grazing. Sagebrush dominates this plant community with canopy cover often exceeding 40 percent. The canopy cover will be higher in the western portions of the MLRA. The understory of grass includes rhizomatous wheatgrasses, blue grama, buffalograss, green needlegrass, Sandberg bluegrass, and prairie Junegrass. The sagebrush canopy protects the cool-season grasses, but this protection makes them unavailable for grazing. Sagebrush is long-lived and will persist for a long period without fire. When compared to the Western Wheatgrass/Green Needlegrass Plant Community, sagebrush has increased while most of the grass species have declined in production. The sagebrush canopy provides some protection to the cool-season midgrasses, by making them unavailable for grazing. This plant community is stable. The soil erosion is low to moderate. Infiltration and runoff are moderate. Subsoil moisture conditions are typically drier due to the high water demand of the sagebrush. This makes sagebrush highly competitive with other species.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	500	670	1075
Shrub/Vine	145	303	252
Forb	50	83	120
Moss	5	44	80
Total	**700**	**1100**	**1527**

Figure 13. Plant community growth curve (percent production by month). SD5803, Northern Rolling High Plains, cool-season/warm-season co-dominant.. Cool-season, warm-season co-dominant, uplands..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	20	28	21	10	5	3	0	0

State 5
Annual Pioneer

The State narrative is under development.

Community 5.1
Annual, Pioneer Perennial; Introduced, or Invaded States

This group includes three separate vegetation states that are highly variable in nature. They are derived through distinct management scenarios and are not related successionally. Infiltration, runoff, and soil erosion varies depending on the vegetation present on the site. The Annual, Pioneer Perennial state can be reached whenever severe disturbance (i.e., abandoned farmland, severe continuous season-long grazing, frequent and severe defoliation by rodents, etc.,) occurs. During the early successional stages, the species that mainly dominant are annual grasses and forbs, later being replaced by both native and introduced perennials. The vegetation on this site varies greatly, sometimes being dominated by threeawn, cheatgrass, crested wheatgrass, broom snakeweed, buffalograss, sweetclover, and nonnative thistles. Other plants that commonly occur on the site include wheatgrass, prickly lettuce, marestail, kochia, squirreltail, foxtail, and sunflowers. The Introduced state is normally those areas seeded to introduced grasses and sometimes alfalfa. It requires considerable investment to establish and has a variable life expectancy. The Invaded state includes areas that have been invaded, and are dominated by species such as smooth bromegrass, Kentucky bluegrass, crested wheatgrass, nonnative thistles, field bindweed, knapweeds, leafy spurge, hoary cress, and other introduced species.

Transition T1a
State 1 to 2

With heavy continuous seasonal grazing this plant community will move towards the Buffalograss/Blue Grama/Clubmoss Plant Community.

Transition T1b
State 1 to 4

No fire and continuous long season grazing for long periods of time will convert this plant community to the Sagebrush Plant Community

Transition T5
State 1 to 5

Cropped go-back, seeding of introduced species or invasion of introduced species may lead to an Annual Pioneer Perennial; Introduced or Invaded State.

Transition T5
State 1 to 5

Cropped go-back, seeding of introduced species or invasion of introduced species may lead to an Annual Pioneer Perennial; Introduced or Invaded State.

Transition T5
State 1 to 5

Cropped go-back, seeding of introduced species or invasion of introduced species may lead to an Annual Pioneer Perennial; Introduced or Invaded State.

Restoration pathway R2
State 2 to 1

Long-term prescribed grazing, possibly including prescribed burning, and favorable climatic conditions, which allow for adequate plant recovery periods, may cause a shift to the Buffalograss/Blue Grama/Western Wheatgrass Plant Community.

Conservation practices

Prescribed Burning
Prescribed Grazing

Transition T2b
State 2 to 3

An altered vegetation community can be achieved through mechanical renovation. Renovation creates microrelief that alters the water cycle by increasing infiltration and decreasing runoff. The renovation reduces the sod-bound conditions, increasing the vegetative production potential.

Transition T2a
State 2 to 5

Heavy, continuous season-long grazing, or frequent and severe defoliation (e.g., rodents) will move this plant community to the Annual, Pioneer Perennial Plant Community.

Transition T5

State 2 to 5

Cropped go-back, seeding of introduced species or invasion of introduced species may lead to an Annual Pioneer Perennial; Introduced or Invaded State.

Transition T5
State 3 to 5

Cropped go-back, seeding of introduced species or invasion of introduced species may lead to an Annual Pioneer Perennial; Introduced or Invaded State.

Transition T5
State 3 to 5

Cropped go-back, seeding of introduced species or invasion of introduced species may lead to an Annual Pioneer Perennial; Introduced or Invaded State.

Restoration pathway R4
State 4 to 1

With brush management and long-term prescribed grazing, this plant community may eventually return to the Big Sagebrush/Western Wheatgrass Plant Community.

Conservation practices

Brush Management
Prescribed Grazing

Transition T5
State 4 to 5

Cropped go-back, seeding of introduced species or invasion of introduced species may lead to an Annual Pioneer Perennial; Introduced or Invaded State.

Restoration pathway R5
State 5 to 1

Range Seeding, followed by long term prescribed grazing can coverted this to a plant community resembling the Reference State.

Additional community tables

Table 10. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Wheatgrass**			570–855	
	western wheatgrass	PASM	*Pascopyrum smithii*	570–855	–
	Montana wheatgrass	ELAL7	*Elymus albicans*	0–190	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–190	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–190	–
2	**Needlegrass**			285–475	
	green needlegrass	NAVI4	*Nassella viridula*	190–475	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–57	–

	porcupinegrass	HESP11	*Hesperostipa spartea*	0–57	–
3	**Cool-Season Grasses**			19–95	
	plains reedgrass	CAMO	*Calamagrostis montanensis*	0–57	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	19–38	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–38	–
4	**Warm-Season Grasses**			95–190	
	big bluestem	ANGE	*Andropogon gerardii*	0–190	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	19–190	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	0–190	–
5	**Short-Warm Season Grasses**			95–190	
	buffalograss	BODA2	*Bouteloua dactyloides*	19–190	–
	blue grama	BOGR2	*Bouteloua gracilis*	57–190	–
6	**Grass-Likes**			19–95	
	needleleaf sedge	CADU6	*Carex duriuscula*	19–95	–
	threadleaf sedge	CAFI	*Carex filifolia*	19–95	–
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	19–95	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–57	–
Forb					
8	**Forbs**			95–190	
	Forb, native	2FN	*Forb, native*	19–57	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	19–57	–
	false boneset	BREU	*Brickellia eupatorioides*	0–57	–
	purple prairie clover	DAPU5	*Dalea purpurea*	19–57	–
	American vetch	VIAM	*Vicia americana*	19–57	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–38	–
	sanddune wallflower	ERCAC	*Erysimum capitatum var. capitatum*	0–38	–
	leafy wildparsley	MUDI	*Musineon divaricatum*	0–38	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–38	–
	dotted blazing star	LIPU	*Liatris punctata*	19–38	–
	milkvetch	ASTRA	*Astragalus*	0–38	–
	silverleaf Indian breadroot	PEAR6	*Pediomelum argophyllum*	0–38	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	19–38	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	19–38	–
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	19–38	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–19	–
	beardtongue	PENST	*Penstemon*	0–19	–
	spiny phlox	PHHO	*Phlox hoodii*	0–19	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–19	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–19	–
	littlepod false flax	CAMI2	*Camelina microcarpa*	0–19	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	0–19	–
	onion	ALLIU	*Allium*	0–19	–

	onion	ALLIU	*Allium*	0–19	–
	pussytoes	ANTEN	*Antennaria*	0–19	–
	desertparsley	LOMAT	*Lomatium*	0–19	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–19	–
	purple locoweed	OXLA3	*Oxytropis lambertii*	0–19	–
	bighead pygmycudweed	EVPR	*Evax prolifera*	0–19	–
	deathcamas	ZIGAD	*Zigadenus*	0–19	–
Shrub/Vine					
9	**Shrubs**			95–190	
	silver sagebrush	ARCA13	*Artemisia cana*	0–95	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0–95	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	0–57	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0–57	–
	Nuttall's saltbush	ATNU2	*Atriplex nuttallii*	0–57	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–57	–
	prairie sagewort	ARFR4	*Artemisia frigida*	19–38	–
	prairie rose	ROAR3	*Rosa arkansana*	0–38	–
	pricklypear	OPUNT	*Opuntia*	0–19	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–19	–
Moss					
10	**Cryptogams**			0–19	
	lesser spikemoss	SEDE2	*Selaginella densa*	0–19	–

Table 11. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Wheatgrass**			60–240	
	western wheatgrass	PASM	*Pascopyrum smithii*	60–240	–
	Montana wheatgrass	ELAL7	*Elymus albicans*	0–60	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–60	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–60	–
2	**Needlegrass**			24–120	
	green needlegrass	NAVI4	*Nassella viridula*	24–120	–
3	**Cool-Season Grasses**			12–36	
	prairie Junegrass	KOMA	*Koeleria macrantha*	12–24	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–24	–
4	**Warm-Season Grasses**			0–60	
	big bluestem	ANGE	*Andropogon gerardii*	0–60	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–36	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	0–36	–
5	**Short-Warm Season Grasses**			180–420	
	blue grama	BOGR2	*Bouteloua gracilis*	120–300	–
	buffalograss	BODA2	*Bouteloua dactyloides*	60–240	–

6	**Grass-Likes**			60–180	
	needleleaf sedge	CADU6	*Carex duriuscula*	24–120	–
	threadleaf sedge	CAFI	*Carex filifolia*	24–120	–
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	12–96	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–36	–
7	**Non-Native Grasses**			12–60	
	cheatgrass	BRTE	*Bromus tectorum*	12–60	–
	bluegrass	POA	*Poa*	12–60	–
Forb					
8	**Forbs**			60–120	
	white sagebrush	ARLU	*Artemisia ludoviciana*	12–48	–
	Forb, native	2FN	*Forb, native*	12–36	–
	silverleaf Indian breadroot	PEAR6	*Pediomelum argophyllum*	12–36	–
	woolly plantain	PLPA2	*Plantago patagonica*	12–24	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	0–24	–
	bighead pygmycudweed	EVPR	*Evax prolifera*	12–24	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	12–24	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–24	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–24	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	12–24	–
	Forb, introduced	2FI	*Forb, introduced*	12–24	–
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	0–12	–
	American vetch	VIAM	*Vicia americana*	0–12	–
	deathcamas	ZIGAD	*Zigadenus*	0–12	–
	sanddune wallflower	ERCAC	*Erysimum capitatum var. capitatum*	0–12	–
	milkvetch	ASTRA	*Astragalus*	0–12	–
	littlepod false flax	CAMI2	*Camelina microcarpa*	0–12	–
	onion	ALLIU	*Allium*	0–12	–
	pussytoes	ANTEN	*Antennaria*	0–12	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–12	–
	dotted blazing star	LIPU	*Liatris punctata*	0–12	–
	desertparsley	LOMAT	*Lomatium*	0–12	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–12	–
	leafy wildparsley	MUDI	*Musineon divaricatum*	0–12	–
	purple locoweed	OXLA3	*Oxytropis lambertii*	0–12	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–12	–
	spiny phlox	PHHO	*Phlox hoodii*	0–12	–
Shrub/Vine					
9	**Shrubs**			60–120	
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0–60	–
	silver sagebrush	ARCA13	*Artemisia cana*	0–60	–
	prairie sagewort	ARFR4	*Artemisia frigida*	12–60	–

	big sagebrush	ARTR2	*Artemisia tridentata*	0–60	–
	pricklypear	OPUNT	*Opuntia*	12–36	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	0–36	–
	prairie rose	ROAR3	*Rosa arkansana*	0–24	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–12	–
Moss					
10	**Cryptogams**			0–36	
	lesser spikemoss	SEDE2	*Selaginella densa*	0–36	–

Table 12. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Wheatgrass**			240–480	
	western wheatgrass	PASM	*Pascopyrum smithii*	240–480	–
	Montana wheatgrass	ELAL7	*Elymus albicans*	0–80	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–80	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–80	–
2	**Needlegrass**			32–160	
	green needlegrass	NAVI4	*Nassella viridula*	32–160	–
3	**Cool-Season Grasses**			16–80	
	prairie Junegrass	KOMA	*Koeleria macrantha*	16–48	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–32	–
	plains reedgrass	CAMO	*Calamagrostis montanensis*	0–32	–
4	**Warm-Season Grasses**			0–80	
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–48	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	0–48	–
	big bluestem	ANGE	*Andropogon gerardii*	0–32	–
5	**Short-Warm Season Grasses**			160–320	
	buffalograss	BODA2	*Bouteloua dactyloides*	80–320	–
	blue grama	BOGR2	*Bouteloua gracilis*	80–320	–
6	**Grass-Likes**			80–240	
	needleleaf sedge	CADU6	*Carex duriuscula*	32–160	–
	threadleaf sedge	CAFI	*Carex filifolia*	32–160	–
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	16–112	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–48	–
7	**Non-Native Grasses**			16–80	
	cheatgrass	BRTE	*Bromus tectorum*	16–80	–
	bluegrass	POA	*Poa*	16–80	–
Forb					
8	**Forbs**			80–160	
	white sagebrush	ARLU	*Artemisia ludoviciana*	16–64	–
	silverleaf Indian breadroot	PEAR6	*Pediomelum argophyllum*	16–48	–

	Forb, introduced	2FI	*Forb, introduced*	16–48	–
	Forb, native	2FN	*Forb, native*	16–48	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	16–48	–
	false boneset	BREU	*Brickellia eupatorioides*	0–32	–
	littlepod false flax	CAMI2	*Camelina microcarpa*	0–32	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–32	–
	purple prairie clover	DAPU5	*Dalea purpurea*	16–32	–
	sanddune wallflower	ERCAC	*Erysimum capitatum var. capitatum*	0–32	–
	bighead pygmycudweed	EVPR	*Evax prolifera*	16–32	–
	leafy wildparsley	MUDI	*Musineon divaricatum*	0–32	–
	dotted blazing star	LIPU	*Liatris punctata*	16–32	–
	spiny phlox	PHHO	*Phlox hoodii*	0–32	–
	woolly plantain	PLPA2	*Plantago patagonica*	16–32	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	0–32	–
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	0–32	–
	American vetch	VIAM	*Vicia americana*	0–16	–
	deathcamas	ZIGAD	*Zigadenus*	0–16	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–16	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	0–16	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–16	–
	desertparsley	LOMAT	*Lomatium*	0–16	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–16	–
	milkvetch	ASTRA	*Astragalus*	0–16	–
	purple locoweed	OXLA3	*Oxytropis lambertii*	0–16	–
	beardtongue	PENST	*Penstemon*	0–16	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–16	–
	onion	ALLIU	*Allium*	0–16	–
	pussytoes	ANTEN	*Antennaria*	0–16	–
Shrub/Vine					
9	**Shrubs**			160–400	
	silver sagebrush	ARCA13	*Artemisia cana*	32–240	–
	big sagebrush	ARTR2	*Artemisia tridentata*	32–240	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0–80	–
	prairie sagewort	ARFR4	*Artemisia frigida*	16–80	–
	pricklypear	OPUNT	*Opuntia*	16–64	–
	prairie rose	ROAR3	*Rosa arkansana*	16–48	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	0–48	–
	Nuttall's saltbush	ATNU2	*Atriplex nuttallii*	0–32	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–16	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–16	–
Moss					
10	**Cryptogams**			16–48	
	lesser spikemoss	SEDE2	*Selaginella dense*	16–48	

	lesser spikemoss	SEDE2	*Selaginella densa*	10–48	–

Table 13. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Wheatgrass**			7–70	
	western wheatgrass	PASM	*Pascopyrum smithii*	7–70	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–21	–
2	**Needlegrass**			0–21	
	green needlegrass	NAVI4	*Nassella viridula*	0–21	–
3	**Cool-Season Grasses**			7–21	
	prairie Junegrass	KOMA	*Koeleria macrantha*	7–21	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–14	–
5	**Short-Warm Season Grasses**			175–350	
	blue grama	BOGR2	*Bouteloua gracilis*	105–245	–
	buffalograss	BODA2	*Bouteloua dactyloides*	70–175	–
6	**Grass-Likes**			70–140	
	needleleaf sedge	CADU6	*Carex duriuscula*	35–105	–
	threadleaf sedge	CAFI	*Carex filifolia*	35–105	–
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	14–70	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–21	–
7	**Non-Native Grasses**			7–35	
	cheatgrass	BRTE	*Bromus tectorum*	7–35	–
	bluegrass	POA	*Poa*	7–35	–
Forb					
8	**Forbs**			35–70	
	Forb, introduced	2FI	*Forb, introduced*	7–35	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	7–35	–
	silverleaf Indian breadroot	PEAR6	*Pediomelum argophyllum*	7–35	–
	woolly plantain	PLPA2	*Plantago patagonica*	7–21	–
	bighead pygmycudweed	EVPR	*Evax prolifera*	7–21	–
	Forb, native	2FN	*Forb, native*	7–21	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	7–21	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	7–14	–
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	0–7	–
	deathcamas	ZIGAD	*Zigadenus*	0–7	–
	pussytoes	ANTEN	*Antennaria*	0–7	–
	milkvetch	ASTRA	*Astragalus*	0–7	–
	littlepod false flax	CAMI2	*Camelina microcarpa*	0–7	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–7	–
	desertparsley	LOMAT	*Lomatium*	0–7	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–7	–

	leafy wildparsley	MUDI	*Musineon divaricatum*	0–7	–
	purple locoweed	OXLA3	*Oxytropis lambertii*	0–7	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	0–7	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–7	–
	spiny phlox	PHHO	*Phlox hoodii*	0–7	–
Shrub/Vine					
9	**Shrubs**			35–70	
	silver sagebrush	ARCA13	*Artemisia cana*	0–35	–
	prairie sagewort	ARFR4	*Artemisia frigida*	7–35	–
	pricklypear	OPUNT	*Opuntia*	7–35	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0–35	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0–28	–
	prairie rose	ROAR3	*Rosa arkansana*	0–7	–
Moss					
10	**Cryptogams**			7–49	
	lesser spikemoss	SEDE2	*Selaginella densa*	7–49	–

Table 14. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Wheatgrass**			0–110	
	western wheatgrass	PASM	*Pascopyrum smithii*	0–110	–
3	**Cool-Season Grasses**			11–55	
	prairie Junegrass	KOMA	*Koeleria macrantha*	11–33	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–22	–
5	**Short-Warm Season Grasses**			110–275	
	buffalograss	BODA2	*Bouteloua dactyloides*	55–275	–
	blue grama	BOGR2	*Bouteloua gracilis*	55–275	–
6	**Grass-Likes**			55–220	
	needleleaf sedge	CADU6	*Carex duriuscula*	22–165	–
	threadleaf sedge	CAFI	*Carex filifolia*	22–165	–
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	11–110	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–33	–
7	**Non-Native Grasses**			22–110	
	cheatgrass	BRTE	*Bromus tectorum*	11–88	–
	bluegrass	POA	*Poa*	11–88	–
Forb					
8	**Forbs**			55–110	
	white sagebrush	ARLU	*Artemisia ludoviciana*	11–55	–
	Forb, introduced	2FI	*Forb, introduced*	11–44	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	11–44	–
	Forb, native	2FN	*Forb, native*	11–33	–

	littlepod false flax	CAMI2	*Camelina microcarpa*	0–33	–
	bighead pygmycudweed	EVPR	*Evax prolifera*	11–33	–
	silverleaf Indian breadroot	PEAR6	*Pediomelum argophyllum*	11–33	–
	woolly plantain	PLPA2	*Plantago patagonica*	11–33	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–11	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	0–11	–
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	0–11	–
	deathcamas	ZIGAD	*Zigadenus*	0–11	–
	dotted blazing star	LIPU	*Liatris punctata*	0–11	–
	desertparsley	LOMAT	*Lomatium*	0–11	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–11	–
	leafy wildparsley	MUDI	*Musineon divaricatum*	0–11	–
	purple locoweed	OXLA3	*Oxytropis lambertii*	0–11	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–11	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–11	–
	sanddune wallflower	ERCAC	*Erysimum capitatum var. capitatum*	0–11	–
	onion	ALLIU	*Allium*	0–11	–
	pussytoes	ANTEN	*Antennaria*	0–11	–
	milkvetch	ASTRA	*Astragalus*	0–11	–
Shrub/Vine					
9	**Shrubs**			165–440	
	silver sagebrush	ARCA13	*Artemisia cana*	55–275	–
	big sagebrush	ARTR2	*Artemisia tridentata*	55–275	–
	prairie sagewort	ARFR4	*Artemisia frigida*	11–77	–
	pricklypear	OPUNT	*Opuntia*	11–66	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0–44	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	0–33	–
	prairie rose	ROAR3	*Rosa arkansana*	11–22	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–11	–
Moss					
10	**Cryptogams**			11–77	
	lesser spikemoss	SEDE2	*Selaginella densa*	11–77	–

Animal community

Animal Community – Wildlife Interpretations
Major Land Resource Area 58D lies within the drier portion of Northern mixed-grass prairie ecosystem where sagebrush steppes to the west yield to grassland steppes to the east. Prior to European settlement, this area consisted of diverse grass/shrub land habitats interspersed with varying densities of depressional, in-stream wetlands, and woody riparian corridors. These habitats provided critical life cycle components for many of its users. Many species of grassland birds, small mammals, reptiles, amphibians, and herds of roaming bison, elk, and pronghorn were among the inhabitants adapted to this semi-arid region. Roaming herbivores, as well as several small mammal and insect species, were the primary consumers linking the grassland resources to predators such as the wolf, mountain lion, and grizzly bear, as well as, smaller carnivores such as the coyote, bobcat, fox, and raptors. The black-tailed prairie dog was once abundant; however, the species remains a keystone species within its range. The black-footed ferret, burrowing owl, ferruginous hawk, mountain plover, and swift fox were associated

with prairie dog complexes.

Historically, the Northern mixed-grass prairie was a disturbance-driven ecosystem with fire, herbivory and climate functioning as the primary disturbance factors either singly or in combination. Following European settlement, livestock grazing, cropland conversion, elimination of fire, energy development and other anthropogenic factors influenced species composition and abundance. Introduced and invasive species further impacted plant and animal communities. Bison were historically a keystone species but have been extirpated as a free-ranging herbivore. The loss of the bison, reduction of prairie dog colonies, and loss of fire as ecological drivers greatly influenced the character of the remaining native plant communities and altered wildlife habitats. Human development has reduced habitat quality for area-sensitive species.

Within MLRA 58D, the Clayey Ecological Site (ES) provides upland grassland cover with an associated forb and shrub component. It was typically part of an expansive grassland landscape that included combinations of Shallow Loamy, Shallow Clayey, Thin Loamy, Claypan, Sandy, Sandy Claypan, Loamy, and Thin Claypan ESs. This site provided habitat for species requiring unfragmented grassland. Important habitat features and components found commonly or exclusively on this site may include greater sage-grouse and sharp-tailed grouse leks; upland nesting habitat for grassland birds, forbs and insects for brood habitat; and a forage source for small and large herbivores. Many grassland and shrub steppe nesting bird populations are declining. Extirpated species include free-ranging bison, grizzly bear, gray wolf, black-footed ferret, mountain plover, Rocky Mountain locust, and swift fox.

The majority of the Clayey ES remains intact and provides increasingly important habitat for grassland and shrub steppe nesting birds, small rodents, coyote, and a variety of reptiles, amphibians, and insects. Invasive species such as annual bromegrasses and crested wheat have impacted the biological integrity of the site for some grassland birds such as greater sage-grouse. Changes in historic fire regime and domestic grazing have impacted the forb/shrub/grass percentages. Greater

sage-grouse and Brewer’s sparrow benefit when big sagebrush increases.

Western Wheatgrass/Green Needlegrass: The predominance of grasses plus high diversity of forbs and shrubs in this community favors grazers and mixed-feeders, such as deer and pronghorn. Insects, such as pollinators, play a large role in maintaining the forb community and provide a forage base for grassland birds and other species. The complex plant structural diversity provides habitat for a wide array of migratory and resident birds.

Brewer’s and grasshopper sparrow, lark bunting, western meadowlark, greater sage-grouse, and sharp-tailed grouse are common and benefit from the structure and composition this plant community provides. This site provides important breeding habitat for the loggerhead shrike. This site provides excellent nesting and brood rearing habitat for greater sage-grouse and sharp-tailed grouse. Diverse prey populations are available for grassland raptors such as ferruginous hawk, Swainson’s hawk, golden eagle, and prairie falcon.

The diversity of grasses, forbs, and shrubs provide high nutrition levels for small and large herbivores including voles, mice, least chipmunk, thirteen lined ground squirrel, white-tailed jackrabbit, and deer. This ES provides excellent wintering habitat for pronghorn. The moderate stature of this plant community provides suitable thermal, protective, and escape cover for small herbivores and grassland birds. Predators utilizing this plant community include coyote, American badger, red fox, and long-tailed weasel. This plant community provides habitat for spade foot toad, Great Plains toad, bull snake, and western rattlesnake.

Buffalograss/Blue Grama/Western Wheatgrass: Resulting from continued heavy continuous season-long grazing without adequate recovery periods between grazing events or increased fire frequency, blue grama, and western wheatgrass will dominate. The forb diversity has decreased. A shift to shorter plant structure will favor prairie dog expansion and associate species such as ferruginous hawk, burrowing owl, tiger salamander, and swift fox. Species such as the horned lark, long-billed curlew, upland sandpiper, and white-tailed jackrabbit will increase due to the loss of big sagebrush. Density of species such as Brewer’s sparrow, greater sage-grouse, as well as, desert cottontail will greatly decline. However, this plant community may provide areas suitable for lek site development.

The short stature of this plant community limits thermal, protective, and escape cover. Predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel.

Buffalograss/Blue Grama/Clubmoss: This plant community develops under continuous seasonal grazing or from

over utilization during extended drought periods. The forb diversity has decreased. A shift to short plant structure will favor prairie dog expansion with prairie dog town sites and associate species such as ferruginous hawk and burrowing owl. Species such as the horned lark, long-billed curlew, upland sandpiper, and white-tailed jackrabbit will increase due to the loss of big sagebrush. Species such as Brewer's sparrow, greater sage-grouse, as well as, desert cottontail will rarely use this site.

The short stature of this plant community limits thermal, protective, and escape cover. Prey populations are reduced but are more vulnerable to predation by raptors and mammalian predators. Predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel. Extreme impairment of the ecological processes impacts offsite aquatic habitats through excessive runoff, nutrient, and sediment loads. Elevated surface temperatures resulting from reduced cover and litter will greatly reduce habitat for most amphibian species, grassland birds, and mammals.

Sagebrush/Western Wheatgrass: This plant community develops after an extended fire free period favoring species such as big sage brush. This increases habitat diversity and quality for species such as greater sage-grouse, Brewer's sparrow, and desert cottontail. This site provides excellent habitat for wintering pronghorn and greater sage-grouse. Chestnut-collared longspur may decrease with the increase of big sagebrush while vesper sparrow, and western meadowlark, are still common. Prey populations are available for grassland raptors such as golden eagle, ferruginous hawk, Swainson's hawk, and northern harrier. Predators utilizing this plant community include coyote, American badger, red fox, and long-tailed weasel.

Sagebrush: This plant community develops after an extended fire free period favoring species such as big sage brush. This increases habitat diversity and quality for species such as greater sage-grouse, Brewer's sparrow, and desert cottontail. This site provides excellent habitat for wintering pronghorn and greater sage-grouse. Chestnut-collared longspur may decrease with the increase of big sagebrush while vesper sparrow and western meadowlark are still common. Prey populations are available for grassland raptors such as golden eagle, ferruginous hawk, Swainson's hawk, and northern harrier. Predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel.

Annual/Pioneer Plant Community: This plant community develops under severe disturbance and/or excessive defoliation. This can result from heavy livestock or prairie dog concentration or cropping abandonment (Go-back land). The dominant vegetation includes pioneer annual grasses, forbs, invaders, and early successional biennial and perennial species. Plant species from adjacent ESs may become minor components of this plant community. The community is susceptible to invasion of annual bromegrasses, crested wheatgrass, and other nonnative species due to severe soil disturbances and relatively high percent of bare ground. Soil erosion is potentially high, impacting offsite aquatic habitats through increased runoff, nutrient, and sediment loads. Reduced surface cover, low plant density, low plant vigor, loss of root biomass, and soil compaction, all contribute to decreased wildlife abundance and diversity. Since secondary succession is highly variable, plant and wildlife species will vary. This plant community provides habitat for generalist or early successional species. In addition, these communities may contain prairie dog towns. Prairie dog towns are sites of high plant and wildlife diversity.

Go-back, Introduced, and/or Invaded States: This group includes separate vegetation states that are highly variable in nature. They are derived through distinct management scenarios. These plant communities have been or are highly susceptible to invasion of annual bromegrasses, bluegrasses, crested wheatgrass, and other non-native species. Since secondary succession is highly variable plant and wildlife species will vary. This plant community provides habitat for generalist or early successional species. In addition, these communities may contain prairie dog towns.

The Go-back state can be reached whenever severe mechanical disturbance (i.e., abandoned farmland) is eliminated. Early successional plant communities include annual and perennial weedy type species first to occupy the site. These sites provide diverse foraging, reproductive and escape cover favoring multiple edge species. This pioneer plant community provides abundant opportunity for insect, bird and small mammal foraging due to abundant flowers and seed sources.
The Introduced state provides increased forage and; therefore, a potential for increased herbivore populations such as deer, pronghorn, and various small mammals. These sites provide diverse foraging, reproductive, and escape cover favoring multiple edge species.

The Invaded state includes areas that have been invaded, and are dominated by species such as smooth brome,

Kentucky bluegrass, crested wheatgrass, nonnative thistles, field bindweed, knapweeds, leafy spurge, hoary cress, and other introduced species. These sites greatly reduce foraging, reproductive, and escape cover for grassland nesting bird species.

Animal Community – Grazing Interpretations
As this site improves in condition through proper management (from the more short grass dominated plant communities to the interpretive plant community), the advantage for livestock production includes: higher forage production from cool-season grasses, improved early spring forage production, and higher water infiltration. The disadvantage for livestock include: reduction in cool-/warm-season grass mix which would provides better management flexibility, less plant diversity, and a potential increase in soil erosion. The Annual, Pioneer Perennial Plant Community is of limited value for livestock production.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage. During the dormant period, the forage for livestock will likely be lacking protein to meet livestock requirements, and added protein will allow ruminants to better utilize the energy stored in grazed plant materials. A forage quality test (either directly or through fecal sampling) should be used to determine the level of supplementation needed.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group D. Infiltration and runoff potential for this site varies from moderate to high depending on soil hydrologic group, slope, and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An exception would be where shortgrasses form a strong sod and dominate the site. Normally, areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

Recreational uses

This site provides hunting opportunities for upland game species. The wide varieties of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are typically present on this site.

Other products

Seed harvest of native plant species can provide additional income on this site.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations and experience were also used. Those involved in developing this site description include: Ryan Beer, Range Management Specialist (RMS), NRCS; Chuck Berdan, Biologist, Bureau
of Land Management (BLM); Stan Boltz, RMS, NRCS; Dave Dewald, Wildlife Biologist (BIO), NRCS; Jody Forman, RMS, NRCS; Dennis Froemke, RMS, NRCS; Tom Juntti, BIO, United States Forest Service (USFS); Cheryl Nielsen, RMS, NRCS; Jeff Printz, RMS, NRCS; Mike Stirling, RMS, NRCS; Dan Svingen, BIO, USFS; Darrell Vanderbusch, Soil Scientist, NRCS; Cindy Zachmeier, BIO, NRCS; and Tim Zachmeier, BIO, BLM.

Other references

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Contributors

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Travis Patient

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Stan Boltz, Ryan Beer, Mitch Iverson, Thad Berrett, Cheryl Nielsen
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Date	07/23/2009
Approved by	Stan Boltz
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None.

2. **Presence of water flow patterns:** None, or barely visible and discontinuous.

3. **Number and height of erosional pedestals or terracettes:** None.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 0 to 10 percent is typical.

5. **Number of gullies and erosion associated with gullies:** None should be present.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

7. **Amount of litter movement (describe size and distance expected to travel):** Litter should fall in place. Slight amount

of movement of smallest size class litter is possible, but not normal.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil aggregate stability ratings should typically be 5 to 6, normally 6. Surface organic matter adheres to the soil surface. Soil surface fragments will typically retain structure indefinitely when dipped in distilled water.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A-horizon should be 3 to 6 inches thick with mollic (dark) colors when moist. Structure typically is medium to fine granular at least in the upper A-horizon.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Combination of shallow and deep rooted species (mid & tall rhizomatous and tufted perennial cool-season grasses) with fine and coarse roots positively influences infiltration.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None – when dry, B horizons can be hard and appear to be compacted, but no platy structure will be present.

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Rhizomatous wheatgrasses > mid cool-season bunchgrasses >>

    Sub-dominant: Mid warm-season grasses = short warm-season grass >

    Other: Forbs = shrubs > short cool-season bunchgrasses

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little evidence of decadence or mortality. Bunch grasses have strong, healthy centers and shrubs are vigorous.

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Production ranges from 1,300-2,600 lbs./acre (air-dry weight). Reference value production is 1,900 lbs./acre (air-dry weight).

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if**

their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site: State and local noxious weeds, Kentucky bluegrass

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17. **Perennial plant reproductive capability:** All species exhibit high vigor relative to climatic conditions. Do not rate based solely on seed production. Perennial grasses should have vigorous rhizomes or tillers.